Tektronix®

Service Procedures

Product: CPS250 Triple Output Power Supply

Title: Performance Verification & Adjustment

Procedure #: CP1009 Revision: A

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Measurement Business Service Support

REVISION LEVEL SUMMARY:

Revision #	Date	Initiator	Level Change From: To:	Description
A	6/19/97	Roy Lindley	n/a	Initial release

Performance Verification

Introduction

This procedure checks the electrical characteristics listed in the specification section of the Operator manual, P/N 070-6740-xx. If the instrument fails to meet the requirements given in this performance verification, the adjustment procedure in next section should be done. The performance verification may also be used as an acceptance test or as a troubleshooting aid.

You do not have to remove the instrument case to do this procedure. All checks can be made with controls and connectors accessible from the outside.

To ensure instrument accuracy check its performance after every 2000 hours of operation, or once each year if used infrequently. If these checks indicate a need for readjustment or repair, refer the instrument to a qualified service person.

CONTENTS:

Test Equipment Needed

The test equipment listed in Table 1 is a list of the equipment needed for this performance verification. All test equipment is assumed to be operating within tolerance. Detailed operating instructions for test equipment are not given in this procedure. If operating information is needed, refer to the appropriate test equipment instruction manual.

Table 1

Test Equipment needed

Item Description	Minimum Specification	Purpose	Test equipment Example
1. Digital Multimeter	Dc voltage range, 0 to 200 volts within 0.5%. Dc current range. 0 to 10 Amps within 0.5%	Voltage checks, adjustments, load regulation.	Tektronix DMM916
2. Variable Transformer	108 Vac to 132 Vac. Power 250 W or more.	Line regulation	Technipower W10MT3W Auto Varic.
3. Load Resistors	5% or less, 25 Watts	Voltage checks, adjustments, load regulation, and ripple	Power Resistor Decade Box Model 240C
4. Test Oscilloscopes with 1X probes	Bandwidth: dc to ≥ 20 Mhz. Minimum deflection factor: 5 mV/div Accuracy:±3%	Ripple checks	Tektronix TDS210 Oscilloscope

Preparation:

Connect the test equipment to an appropriate ac-power-input source and connect the CPS250 to a variable autotransformer that is set to 120 Vac. Apply power and allow 20 minutes for the instrument to warm up and stabilize.

Set the following controls for the instrument under test during the warm-up time:

Voltage(both)	Min
Current(both)	Min
A/B OUTPUTS	Independent
A/B	A

PROCEDURE STEPS:

1. Check 5 V Power Supply

a. Connect the power resistor decade box between the 5V- and 5V+ binding posts. Set the resistance value to 3Ω.

b. Connect the digital multimeter common lead to the 5V- binding post and the positive lead from the V-Ω jack to the 5V + binding post. Set the digital multimeter to ≥ 20 dc voltage range.

c. CHECK- The digital multimeter reads between 4.900 V and 5.100 V.

d. CHECK- The voltage varies less than 10mV as the line voltage is changed from 120 V to 108 V and from 120 V to 132 V. Return the line voltage to 120 V.

e. Remove the digital multimeter leads from the instrument. Do not remove the power resistor decade box from the instrument.

f. Connect the test oscilloscope and its 1X probe tip to the 5 V + binding post and the probe ground lead to the 5 V- binding post.

g CHECK- for 6 mV or less of ripple (peak-to-peak).

h. Disconnect the power resistor decade box from the instrument.

i. Connect the digital multimeter positive lead from its ≥ 10A jack to the 5V+ binding post and the negative lead from the COM jack to the 5V- binding post. Set the digital multimeter to 10 A dc current range.

j. CHECK - the digital multimeter reads ≤ 2.0 A.

k. Disconnect the test equipment from the instrument.

2. Check A and B Power Supplies in Independent Mode

a. Connect the power resistor decade box between the A- and the A+ binding posts. Set the resistance value to 40 Ω.

b. Connect the digital multimeter common lead to A- binding post and the positive lead from the V-Ω jack to the A + binding post. Set the digital multimeter to a ≥ 100 dc volt range.

c. Rotate the A CURRENT control from MIN to MAX position.

d. CHECK- The A Power Supply varies from 0.V to ≥ 20 V as the A VOLTAGE control rotates from MIN to MAX positions.

e. CHECK- The digital multimeter reads between 20.000 V and 23.000 V at MAX position..

f. CHECK- The A Power Supply voltage varies less than 10mV as the line voltage is changed from 120 V to 108 V and from 120 V to 132 V. Return the line voltage to 120 V.

g. Disconnect the digital multimeter leads from the instrument. Do not remove the power resistor decade box from the instrument.

h. Connect the test oscilloscope and its 1X probe tip to the A + binding posts and the probe ground to A - binding post.

i. CHECK- For 6mV or less of ripple (peak-to-peak).

j. Disconnect the test equipment from the instrument.

k. Connect the digital multimeter common lead to A - binding post and the positive lead from the A+ binding post. Set the digital multimeter to a ≥ 2 A dc current range.

l. CHECK - the digital multimeter reads between 500 mA and 600 mA.

m. Set A/B switch to B position and repeat parts a through l for B Power Supply.

n. Disconnect the test equipment from the instrument.

3. Check A Power Supply Output Overload.

a. Set:

A VOLTAGE	MIN
A CURRENT	MIN

b. Connect the power resistor decade box between the A - and A + binding posts. Set the resistance value to 40 Ω

c. Rotate the A VOLTAGE control to MAX position.

d. CHECK - The A Overload LED is turned on.

e. Rotate the A CURRENT control to MAX position.

f. CHECK-The A OVERLOAD is turned off as the A CURRENT control is rotated towards the MAX position.

g. Disconnect the test equipment from the instrument

4. Check B Power Supply Overload

a. Set:

B VOLTAGE	MIN
B CURRENT	MIN

b. Connect the power resistor decade box between the B- and b + binding posts. Set the resistance value to 40 Ω.

c Rotate the B VOLTAGE control to MAX position.

d. CHECK - The B Overload LED is turned on.

e. Rotate the B CURRENT control to MAX position.

f. CHECK-The B Overload LED turns off as the B CURRENT control is rotated towards the MAX position.

g. Disconnect the test equipment from the instrument.

5. Check Parallel Tracking:

a. Set

A/B OUTPUTS	PARALLEL TRACKING
VOLTAGE (both)	MIN
CURRENT(both)	MAX
A/B	A

b. Connect the power resistor decade box between the - A and + binding posts. Set the resistance value to 20Ω.

c. Connect the digital multimeter common lead to A - binding post and the positive lead to the A + binding post. Set the digital multimeter to a ≥ 20 dc voltage range.

d. Rotate the A VOLTAGE control clockwise until the digital multimeter reads 20.00 V.

e. Move the digital multimeter from the A- and A + binding posts to the B - and B + binding posts, observe the polarity of the test leads.

f. CHECK - The digital multimeter reads between 19.94 V and 20.06 V.

g. CHECK-The B VOLTAGE control has no effect on the output voltage.

h. Disconnect the test equipment from the instrument.

6. Check Series Tracking

a. Set

A/B OUTPUTS	SERIES
A VOLTAGE	MIN

b. Connect the power resistor decade box between the B - binding post and A + binding post. Set the resistance value to 80 Ω.

c. Connect the digital multimeter common lead to A - binding post and the positive post lead from V- Ω jack to A + binding post. Set the digital multimeter to a ≥ 100 dc voltage range.

d. Rotate the A VOLTAGE control clockwise until the digital multimeter reads 20.00 V.

e. Move the digital multimeter from the A- and A + binding posts to the B - and B + binding posts, observe the polarity of the test leads.

f. CHECK - The digital multimeter reads between 19.94 V and 20.06 V.

g. Rotate the A VOLTAGE control to MIN position.

h. Disconnect the test equipment from the instrument.

This completes the Performance Verification procedure.

ADJUSTMENT PROCEDURE

NOTE:

The Adjustment procedure should be performed only by qualified service technicians.

To ensure instrument accuracy, this Adjustment Procedure should be done very 2000 hours of operation or at least once each year if used infrequently.

CONTENTS:

PREPARATION FOR ADJUSTMENT

Make the adjustments in this procedure at an ambient temperature of + 21 °C to + 25° C (+69.8°F to +77°F and a relative humidity of 75% or less.

It is necessary to remove the top cover from the instrument to gain access to the adjustments located on the component side of the Main circuit board. Disconnect the power cord from the CPS250 and use the following procedure:

1. Ensure the power cord is unplugged from its rear panel connctor.

2. Place the instrument upside down on a clean, flat surface.

NOTE:

Do not remove the two middle-rear screws and washers from the cabinet bottom. These two screws and washers secure the power transformer to the cabinet bottom.

3. Remove the four cabinet securing screws from the bottom of the instrument. The two rear screws also hold the rear rubber feet in place. The front screws to be removed are separate from and to the outside of the front feet.

4. Carefully turn the instrument right side up, while holding together the top and bottom cabinets.

5. Remove the top cabinet, side panels and the handle.

Test equipment needed for these adjustments is described in Table 1 at the beginning of the Performance Check Procedure. Refer to the appropriate test equipment instruction manuals for test equipment operating information.

Connect the test equipment to an appropriate ac power source and connect the CPS250 to a variable autotransformer that is set to 120 Vac. Apply power and allow for 20 minutes for the instrument to warm up and stabilize.

Set the following controls for the instrument under test during warm-up time:

VOLTAGE (both)	IN
CURRENT (both)	IN
A/B OUTPUTS	Independent
A/B	A

PROCEDURE STEPS:

1. Adjust 5 V Power Supply (SVR3, SVR1, and SVR2)

a. Connect the power resistor decade box between the 5 V - and 5V + binding posts. Set the resistance value to 3 Ω.

b. Connect the digital multimeter common lead to the 5 V - binding post and the positive lead from the V - Ω jack to the 5V+ binding post. Set the digital multimeter to a ≥ 20 dc voltage range.

c. ADJUST - The 5V Adj (SVR3) for a digital multimeter reading between 5.01 V and 5.02 V.

d. Change the power resistor decade box resistance value from 3 Ω to 2 Ω.

e. ADJUST - The 2A Adj (SVR1) until the digital multimeter voltage drops sharply, then adjust slowly until the digital multimeter indicates between 4.90 V and 4.99 V.

f. ADJUST - The 5V Overload Adj. (SVR2) until the 5 V Overload Led just turns On.

g. Change the power resistor decade box resistance value from 2 Ω to 3 Ω.

h. CHECK - The digital multimeter reads between 5.01 V and 5.02 V and the 5 V Overload Led goes Out.

2. Adjust A Power Supply Voltage Output (SVR6 and SVR4)

a. Connect the power resistor decade box between the A- and the A+ binding posts. Set the resistance value to 40 Ω

b. Connect the digital multimeter common lead to A - binding post and the positive lead from the V - Ω jack to the A + binding post.

c. Rotate the A CURRENT control from Min to MAX position.

d. Set the digital multimeter to the ≥ 2V dc range and ensure that the A VOLTAGE control is set to MIN position.

e. ADJUST - the A Volt Min (SVR6) for a digital multimeter reading between 0.00 V and 0.03 V.

f. Set the digital multimeter to a > 20 V dc range.

g. Rotate the A VOLTAGE control from MIN to MAX position.

h. ADJUST - the A Volt MAX (SVR4) for a digital multimeter reading between 20.00 V and 20.50 V.

i. Repeat steps d through h until the voltage reading for minimum and maximum adjustments are obtained.

3. Adjust A Power Supply Current Output (SVR5)

a. Connect the digital multimeter common lead to A - binding post and the positive lead from the A jack to the A + binding post. Set the digital multimeter to a ≥ 2A dc current range.

b. ADJUST - The A Current Max (SVR5) for a digital multimeter reading between 510 mA and 540 mA.

c. Disconnect the test equipment from the Instrument.

4. Adjust B Power Supply Voltage Output (SVR9 and SVR8)

a. Set the A/B switch to B position.

b. Connect the power resistor decade box between the B - and B + binding posts. Set the resistance value to 40Ω.

c. Connect the digital multimeter common lead to B - binding post and the positive lead from the V-Ω jack to the B + binding post.

d. Rotate the B CURRENT control from MIN to MAX position.

e. Set the digital multimeter to a ≥ 2V dc range and ensure that the B VOLTAGE control is set to MIN position.

f. Adjust- the B Volt MIN (SVR9) for a voltage reading between 0.00 V and 0.03 V.

g. Set the digital multimeter to a > 20 dc voltage range.

h. Rotate the B VOLTAGE control from MIN to MAX position.

i. ADJUST - The B Volt Max (SVR8) for a voltage reading between 20.00 V and 20.50 V.

5. Adjust B Power Supply Current Output (SVR7)

a. Connect the digital multimeter common lead to B - binding post and the positive lead from the A jack to the B + binding post. Set the digital multimeter to a ≥ 2 A dc current range.

b. Rotate the B CURRENT control to MAX position.

c. ADJUST- The B Current Max (SVR7) for a current reading between 510 mA and 540 mA.

d. Disconnect the test equipment from the instrument.

6. Adjust/Check Series Tracking Voltage (SVR10)

a. Set:

A/B OUTPUTS	SERIES TRACKING
VOLTAGE (both)	MIN
A/B	A

b. Connect the power resistor decade Box between the B - binding post and A + Binding post. Set the resistance value to 80 Ω.

c Connect the digital multimeter common lead to A - binding post and the positive lead from the V-Ω jack to the A + binding post. Ensure the digital multimeter is set to a > 20 dc voltage range.

d. Rotate the A VOLTAGE control for digital multimeter reading of 20.0 V.

e. Move the digital multimeter leads from the A - and A + binding posts to the B- and B + binding posts, observe the polarity of the test leads.

f. Adjust-Series Track Voltage (SVR10) for a digital multimeter reading of 20.00V

g. Rotate the A VOLTAGE control to MIN position.

h. Connect the digital multimeter positive lead to the A + binding post. Return the A VOLTAGE control to MIN position.

i. CHECK-The output voltage varies from 0 V to 40.00 V as the A VOLTAGE control rotates from MIN to MAX positions.

j. CHECK-The B VOLTAGE control has no effect on the output voltage

Note:

The B Overload LED turns on when B VOLTAGE control setting is higher than the A VOLTAGE control setting.

k. Rotate the A VOLTAGE control and the B VOLTAGE control to MIN positions.

l. Disconnect the test equipment from the instrument.

7. Adjust/Check Series Tracking Current SVR11)

a. Connect the digital multimeter common lead to A - binding post and the positive lead from the A jack to the A + binding post. Set the digital multimeter to a ≥ 2 A dc current range.

b. Rotate the A VOLTAGE control towards MAX position.

c. Set the A Current control for a digital multimeter reading of 500 mA.

d. Move the digital multimeter leads from the A - and A + binding posts to the B - and B + binding posts, observe the polarity of the test leads.

e. ADJUST : the Series Track Current (SVR11) for a digital multimeter reading of 500 mA.

f. Rotate the A VOLTAGE control to MIN position.

g. Disconnect the test equipment from the instrument.

This completes the Adjustment procedure.

CPS250
Adjustment Locations